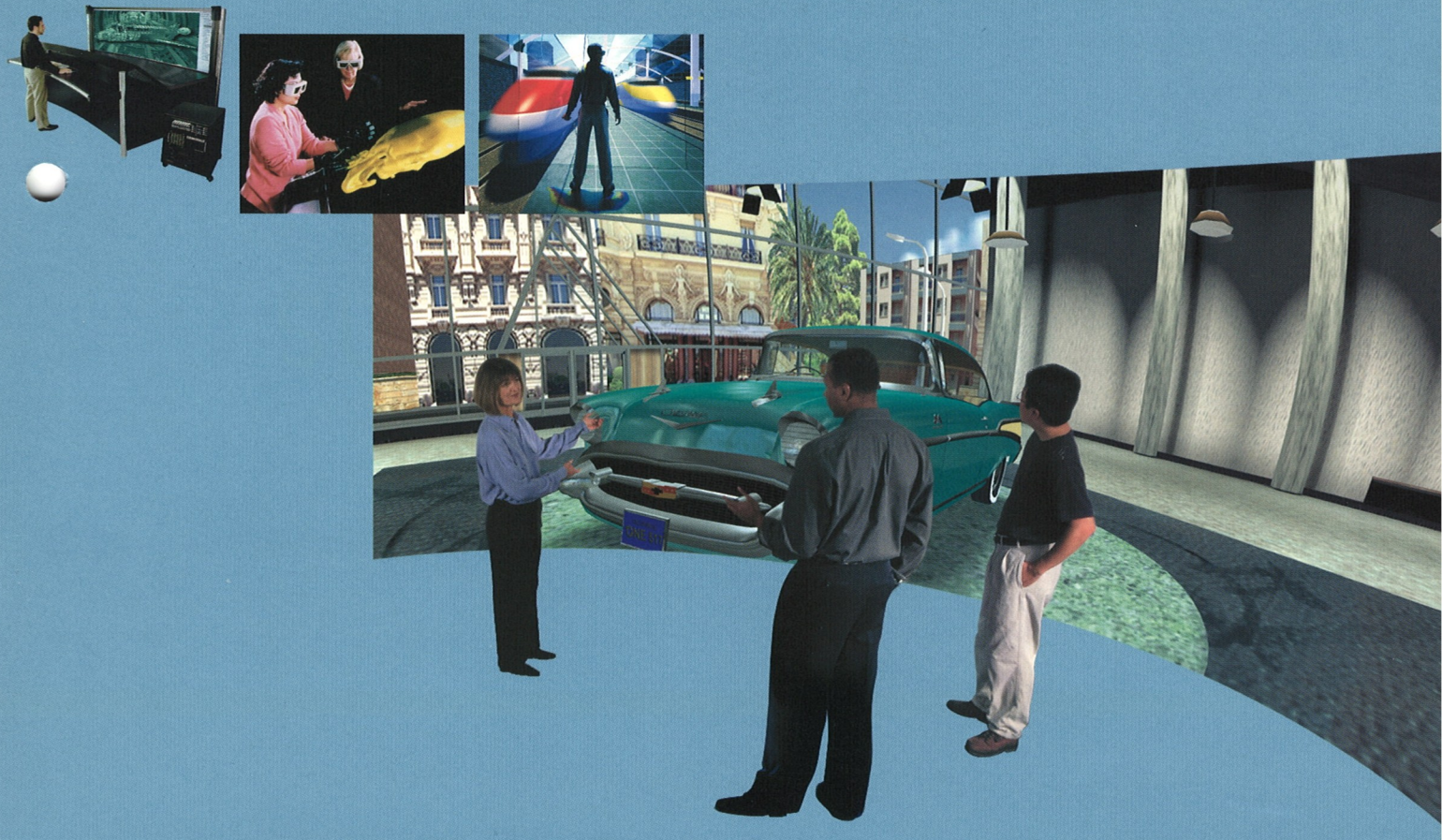
Immersive Visualization Facilities

sgi™

SGI™ Reality Center™ Solutions



The Leader in Immersive Enviro

The SGI Reality Center immersive visualization facility is a collaborative computing environment designed to support multiple business processes, from engineering and design review to data analysis, training, and presentations. This real-time simulation center features a fully integrated, powerful visualization display system for graphics and video applications.

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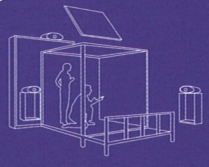
rooms

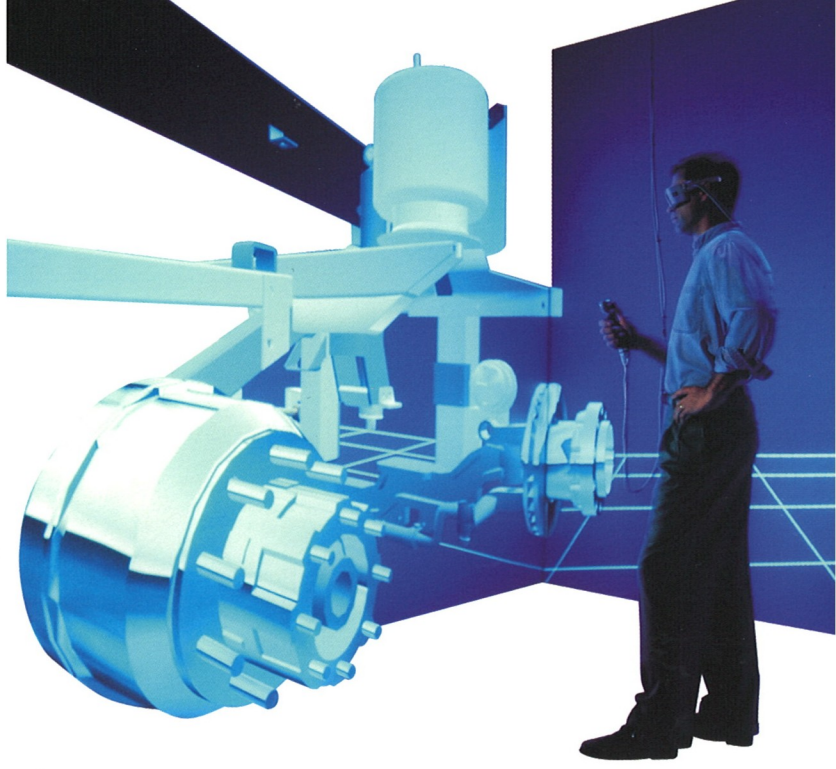


As the most advanced visualization facility for multidimensional, multimedia data, Reality Center immerses you and your colleagues in your data, so you can move around it, hear it, and perceive it much as you perceive the physical world—or in a way that is impossible in the real world.

This approach helps you arrive at better decisions in less time, providing enormous cost savings while enhancing productivity in any situation where spatial relationships must be analyzed. You'll gain insight and reach your goals with greater speed, efficiency, and flexibility than ever before.

A molecular biologist analyzes molecular structures inside the Trimension ReaCTor. Fakespace Pinch glove enable her to grasp, move, and rearrange these virtual objects.

ments



An automotive suspension system created with PTC/Division software and experienced in the Pyramid CAVE.

An engineer tests Volkswagen's virtual prototype of a car interior in a TAN Cube.

Complete Collaborative and Interactive Solutions

Since the world's first Reality Center opened in Reading, England, in July 1994, the SGI Reality Center concept has triggered excitement in industry, academia, and the media. As the Reality Center pioneer, SGI has created solutions to ease your transition to immersive visualization. The goal: to help you implement advanced visualization technologies as powerful business tools, complementing and dramatically improving your business processes.

The Power of Group Visualization

SGI Reality Center solutions:

- Enable collaborative decision-making
- Expedite insights to complex problems
- Significantly reduce production and labor costs
- Streamline project analysis, design, engineering, and testing
- Eliminate the impracticality, danger, or expense encountered in physical environments
- Demonstrate products, processes, and plans with unparalleled realism
- Improve skill acquisition and concept retention
- Enable intuitive exploration and precise analysis of relationships between variables
- Allow interactive analysis of high-resolution, time-varying data sets of unlimited scale

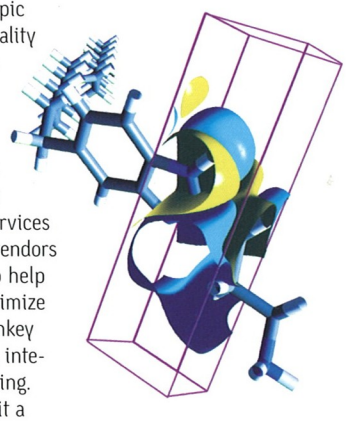
Onyx2—Breathtaking Speed and Performance

At the heart of every Reality Center is Silicon Graphics® Onyx2™, the world's most powerful visualization engine. Onyx2 is the only workstation designed for visual supercomputing; it doubles as a tightly coupled supercomputer and simultaneously processes 3D graphics, imaging, and video data in real time.

Based on an acclaimed architecture, Silicon Graphics Onyx2 provides the industry's richest, deepest feature set, including clip-mapping, texture-paging, volume rendering, and anti-aliased full-frame HDTV display—the kinds of features required for ultrarealistic, high-performance immersion in your interactive simulation. The Onyx2 system equips your Reality Center with multiple visual display channels and superb media tools such as digital audio, video reference input, optional real-time graphics-to-video, and optional digital video for routing multiple video and audio streams. The only workstation designed from the ground up to support immersive visualization, Onyx2 is available in a range of configurations for every level of visual supercomputing.

Widest Range of Display Solutions

Only SGI provides a wide variety of integrated display solutions to suit every organization's needs and budget, from full-scale 360° immersive environments to smaller group facilities, including stereoscopic display and tracking controls. An overview of Reality Center solutions can be found on the back page.



Complete Consulting Services to Support Your Facility Integration

SGI offers extensive services to help customers develop and implement immersive visualization solutions. The SGI Reality Center Integration Services team works closely with customers and display vendors to ensure successful systems integration and to help implement visual computing solutions that maximize return on investment. We provide complete turnkey solutions, including facility design, installation, integration, custom applications, and operator training. SGI offers the broadest range of solutions to suit a wide variety of budgets and needs.

Industries and Applications

Manufacturing

- Digital prototyping
- Engineering analysis
- Production planning and training
- Conceptual design
- Facility walk-throughs

Reality Center collaborative visualization facilities are becoming an indispensable tool in the manufacturing industry, providing rapid return on investment. Engineers and designers can create digital prototypes and implement design changes in a fraction of the time it takes to build expensive physical models, saving money, reducing time-to-market, and improving safety. With Reality Center facilities, engineering, procurement, and marketing teams are now able to participate in high-fidelity, 1:1 scale (and larger) 3D real-time walk-throughs to visualize and interact with every part of a complex design, achieving consensus and avoiding costly mistakes before beginning production.

Energy

- Seismic interpretation and reservoir characterization and simulation
- Drill well planning
- Engineering review
- Off-shore platform design and maintenance training

To achieve and maintain a competitive advantage in oil and gas exploration and production, oil companies need to reduce risk and maximize return on investments by interpreting the subsurface more accurately. Reality Center facilities allow geoscientists to visualize and collaboratively interact with large, high-resolution, 3D seismic data sets to understand subsurface structures and stratigraphy. Using this technology, geologists can cost-effectively and accurately predict drilling sites, run reservoir analyses, or design downstream facilities. Process cycles are shortened, dry holes are avoided, and undetected reserves are pinpointed, resulting in improved ROI.

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desks

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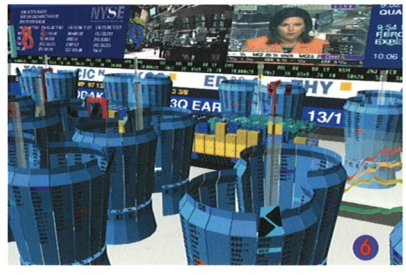

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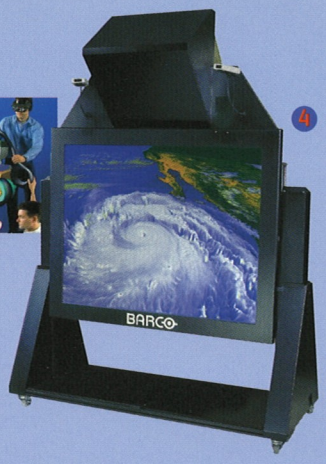

Sciences and Education

- Volume imaging
- Molecular modeling
- Medical simulation for education and training
- Anatomy simulation for surgical planning
- Computer-human interface studies and cognitive science
- Networked collaboration
- Arts, architecture, design, and engineering simulations

Whether being used for training surgeons through virtual surgery, teaching in virtual classrooms, or analyzing volumetric molecular models, interactive visualization and manipulation of data are essential to scientific research and education. Immersive visualization enhances understanding, facilitates insight, and drives better decision-making by enabling researchers and cross-disciplinary groups of collaborators to solve problems through visualizing and interacting with huge, multidimensional data sets and simulation codes in real time.

Interactive Entertainment

- Family entertainment centers
- Heritage reconstruction
- Performance animation
- Museum exhibits, planetariums, and new media art

Reality Center facilities have spawned a whole new world of creative possibilities in entertainment, museum exhibits, heritage preservation, and education. For the first time ever, people have the ability to interactively explore our galaxy, stroll through a life-size virtual model of Egyptian tombs, and ride a roller coaster designed by a 10-year-old. These are just a few real-world examples that combine the total immersion and unprecedented realism offered by SGI solutions. A new level of interactive entertainment has made its debut, and SGI technology and expertise will continue to bring to life this new generation of ideas.

Government

- Command and control
- Surveillance and intelligence
- Mission preparation
- Collaborative geospatial information exploitation
- Training

Reality Center environments can be used by governments around the world for operational command and control, collaborative decision-making, mission preparation activities, and immersive training. Onyx2, with its superb resolution and real-time accuracy, supports data fusion of disparate data sources, including geospatial information, video, visual databases, and computational data. The Reality Center solution is the ultimate tool for visualizing information by providing a collaborative, immersive environment to enhance mission success and decision-making capability.

Business

- Command and control decision-making center
- Strategic business analysis
- Data mining and visualization of business data
- Teleconferencing
- Collaboration

Faster time to insight is the key to achieving and maintaining a competitive advantage in business. This requires the real-time visualization of vast amounts of varied business data integrated into one environment. SGI Reality Center solutions create a business command and control environment granting key decision makers access to all enterprise data. Collaboration, data mining, and data visualization allow organizations to turn vast amounts of data into valuable insight.

1. ClearCoat™ technology from SGI delivers a new level of realism and interactivity for automotive styling and design.
2. Reality Center facilities can immerse the user in an animated fantasy world.
3. Engineers assemble virtual mechanical prototypes using head-mounted displays and data gloves.
4. Hurricane Linda approaching Baja California on September 12, 1997 seen on a BARCO Baron desk.
5. Landmark Graphics geomapping visualization running on the Pyramid ImmersaDesk R2.
6. The New York Stock Exchange's "3D Trading Floor" is a real-time visual representation that allows events on the trading floor to be seen and understood at a glance.
7. A Fakespace Mini WorkBench displaying a volume sculpting visualization from Paradigm Geophysical reveals two stages of deposition below a shallow horizon.
8. The Onyx2 workstation shown with Virtual Research head-mounted display and Fakespace Pinch gloves.

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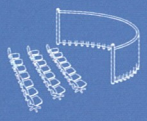
walls

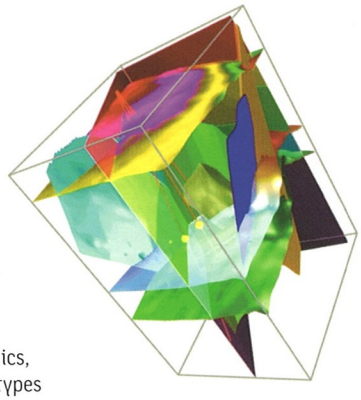


A Landmark geophysical visualization in the Reality Center facility at SGI headquarters. This 25-foot semicircular screen from Trimension provides a 160° horizontal by 40° vertical field of view. For vivid, seamless, multichannel display, the projectors are modified for edge blending, distortion correction, and color balancing. A surround-sound system enhances the digital audio output. A single touch-screen monitor is used to control the audio, video, lighting, and projection systems.

Immersive Software Solution

Virtual fly-throughs in an immersive training environment allow pilots to practice missions and improve decision-making capabilities.

Newport News Shipbuilding employs Panoram's GVR 120E, Division dvMockup software, and Onyx2 RealityMonster for design reviews of onboard ship spaces for the U.S. Navy.



Partnering with the Experts

Great hardware is only part of the solution. SGI works closely with the world's leading software companies to deliver fully integrated, optimized solutions. As a result of these strong partnerships, only SGI provides you with a suite of applications and toolkits that helps you achieve the greatest performance and unsurpassed return on your investment.

- Modeling, Simulation, and Imaging Applications: Aechelon, Boston Dynamics, Centric-Coryphaeus, Mäk Technologies, MultiGen-Paradigm, Virtual Prototypes
- Digital Prototyping, Plant Design, and Urban Simulation Applications: Alias|Wavefront, Cadcentre, CADSI, Computational Engineering International, Centric-Coryphaeus, Dassault Systèmes, Deneb Robotics, Engineering Animation Inc./Sense8/Transom, Genicom, Mechanical Dynamics, MultiGen-Paradigm, Parametric Technology Corporation/Division, Realax, TechMath, Tecnomatix, Tecoplan Informatik, Vircinity, Virtual Prototypes
- Scientific Data Visualization, Research, and Engineering Analysis Applications: Boston Dynamics, Computational Engineering International, Dynamic Graphics, Engineering Animation Inc./Sense8/Transom, GOCAD, Landmark Graphics—a Halliburton Company, Paradigm Geophysical, Schlumberger/GeoQuest
- Entertainment and Education Applications: ACS Studio, Aechelon, Alias|Wavefront, Angel Studios, Boston Dynamics, de pinxi, InterSim, Infobyte, MediaLab, MultiGen-Paradigm, Peak Systems, Viewpoint, Xatrix International

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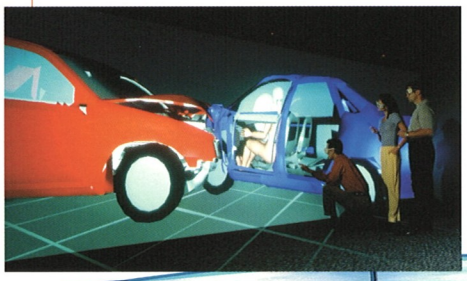
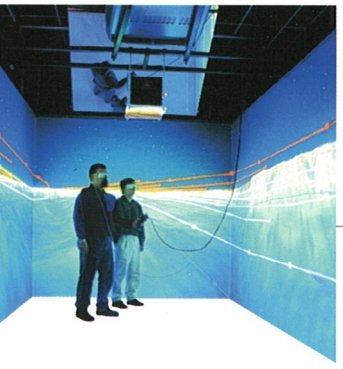
Engineers interact with crash analysis data [run by National Crash Analysis Center] on the Pyramid MindzEye stereo wall.



NASA's new Surface Development and Test Facility is a full-scale air traffic control tower simulator that tests ways to solve potential air and runway traffic problems at commercial airports.

Standard and Custom Solutions

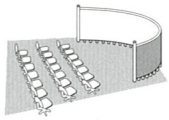
SGI offers fully integrated solutions in a range of configurations and price points to suit your applications, space, and budget.



Researchers at Mississippi State University use the MechDyne MD_SSVR for studying computational fluid dynamics.

Walls

- BARCO CAD Wall/BARCO Immersive Facilities
- Fakespace WorkWall*
- MechDyne MD_CSVR*
- MechDyne MD_Wall*
- Panoram GVR-120/120E
- Panoram PanoWall
- Pyramid MindzEye*
- TAN TANORAMA and StereoVision*
- Trimension/SEOS RealityRoom and Reality Theatre
- Custom stereoscopic and monoscopic projection facilities



Desks

- BARCO Baron
- Fakespace Immersive Workbench and IWB-50*
- Fakespace Mini-Workbench*
- Fakespace VersaBench*
- KRDL Dextroscope
- MechDyne MD_Table*
- Panoram ViewStation
- Pyramid ImmersaDesk*
- TAN Responsive Workbench* and Holobench*
- Trimension V-Desks

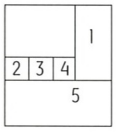
Rooms

- MechDyne MD_Flex*
- MechDyne MD_SSVR*
- Pyramid CAVE*
- TAN Cube*
- Trimension ReaCTor*

*Integrated with head- and/or hand-position tracking sensors

Note: all facilities and systems are designed to support surround-sound audio reproduction and, in some cases, audio spatialization ("3D" or binaural sound localization)

Cover images:



1. Hand is holding earth with view of Hurricane Hugo. The red, green, and blue display channels correspond to the visible, 11 micron, and 6.7 micron instrument channels, respectively.
2. Panoram ViewStation displaying a real-time Dassault Systèmes CATIA digital prototype.
3. Scientists at NASA Ames Center for Bioinformatics plan craniofacial reconstructive surgery, visualizing volumetric patient data on the Fakespace Immersive Workbench.
4. Bullet train station in Europe created using PTC/Division software and visualized in Pyramid CAVE.
5. The SGI Mountain View Reality Center facility featuring EAI software and a Trimension 25-foot semicircular screen.

Technical Specifications and Regulatory Compliance

Reality Center Components

- Onyx2 workstation, available in various configurations
- A wide range of high-brightness projectors and display screens to support various functions and numbers of participants
- Software applications, toolkits, and utilities
- Central data, audio, and lighting control system, including touch-screen panels
- Stereoscopic viewing devices
- Input controllers
- High-fidelity, multichannel audio/video playback
- Support for networked, high-bandwidth interaction between geographic locations
- Innovative software that allows OpenGL® API-based applications to transparently drive multipipe, side field display outputs

Technical Specifications for Reality Center Onyx2

Graphics subsystem ("pipe")	InfiniteReality2™
Number of graphics pipes	Up to 16
Maximum output channels supported	Up to 128
Overlay planes	16
Maximum display capacity (1 pipe)	5.2 million pixels (anti-aliased)

Graphics Performance (Midrange Configuration)

Polygons/sec	Up to 40 million
Texture fill rate (pixels/sec)	Up to 2.7 billion Up to 2.3 billion, anti-aliased
Overlay planes	16
Display channels/pipe	2 or 8
Display capabilities	VGA to HDTV
Texture memory	192MB

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